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BUTTE COUNTY, CALIFORNIA, RESIDENTS:
their knowledge and attitudes about forest fires reassessed

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Data from a 1964 and a 1970 survey of Butte County, California, residents were analyzed to identify the characteristics of people who might be considered high fire risks because of their limited knowledge and negative attitude about fire and their frequent use of wildlands. Age, sex, education, and income were the variables most closely related to variations in knowledge, attitudes, and activity. This analysis identified youths and people 65 years or older, who have limited education and income, as the target groups for attention in fire prevention work.

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Skilled investigators can determine the cause of a forest fire with reasonable accuracy, but are rarely able to tie a specific fire start to the specific person responsible. Consequently, identified fire starters may represent a rather distorted sample of the total population of persons responsible for man-caused forest fires.[1] In most studies, indirect criteria have been used in attempts to characterize types of people who presumably represent high fire risks. People who have limited knowledge of fire behavior and fire prevention, and who have a low estimate of the seriousness of the forest fire problem, but who are frequently in the wildlands would seem to constitute a greater risk than do those whose knowledge and attitudes are more positive, or who seldom, if ever, visit wildland areas.

In an earlier study, using data from a 1964 survey in Butte County, California, I used the indirect method to estimate the proportion of such persons among a typical central California population, and to find out in what ways they differ from others.[2] In that study, the sample population was first divided into quartiles (four equal parts) on the basis of scores on a test of fire and fire prevention knowledge, then further divided on the basis of rating on an attitude scale. People who fell in either the highest or lowest quartile on both these points were further divided on the basis of their wildland activity score. I compared these people on a number of characteristics with those scoring equally low in knowledge and attitude, but showing little wildland activity, as well as with those having high scores, and with the total sample.

The few entries in specific categories resulting from this manipulation made the reported proportions subject to a high degree of variation. A resurvey of the Butte County population in 1970[3] permitted a check on the earlier analysis. A comparison of the 1964 and 1970 studies showed that the reservations expressed about the first study were justified, and that the differences between the two studies were more apparent than their similarities.

This note reports a revised description of high-risk wildland users stemming from a reanalysis of the 1964 and 1970 surveys of Butte County. Knowledge and attitude scores were related separately to various social and economic variables for various levels of wildland use by statistical techniques that, in effect, held extent of wildland activity constant. With the resulting stability of larger numbers, the analysis demonstrated a marked consistency between the two studies.

CHARACTERISTICS OF HIGH RISK PERSONS

From a fire prevention standpoint, it is fortunate that those who most often use high-hazard wildlands tend to know the most about fire and its proper use under such circumstances and also tend to have the most favorable attitudes about the need to protect the fire-fragile resource (*table 1*).[4] But the correlation is not a particularly strong one. Not all frequent users are knowledgeable; nor do they necessarily have positive attitudes. To differentiate between these types of persons who appear to represent different potential risks to the natural environment, knowledge and attitude scores were determined for different levels of wildland use and different social and cultural characteristics. Both knowledge scores and wildland activity were influenced by most of the characteristics measured. The variables appearing to have the most influence were age, sex, education, and income. Attitude scores were less closely affected by the variables considered (*table 1*).

Age–People 65 and older stand out as having significantly lower knowledge scores. This is true of those who make use of the wildlands as well as those who do not. As a group, these older persons are not as active users as younger persons, but a significant number are still frequent users. Attitudes do not differ significantly. The very high activity level of most young persons suggests that a significant number of them must also be considered high fire risks, in spite of the group's *average* knowledge and attitude scores.

Marital status–Married and single respondents do not differ significantly in terms of their knowledge scores, although singles are more active wildland users. Those who are widowed, divorced or separated are less frequent visitors to wildlands, but regardless of use, they have significantly lower knowledge scores. Again, attitude scores do not differ significantly.

Education–Knowledge scores are strongly influenced by the amount of education obtained. Education is also positively related to favorable attitudes. This latter relationship does not hold when controlled for wildland activity.

School status–Whether or not a person is still in school is a function of age. Not surprisingly, both characteristics have a similar relationship with knowledge scores and wildland activity. However, although age was not significantly related to attitude scores, respondents still in school had significantly more positive attitudes toward fire prevention.

Occupational status–Retired persons and housewives stand out as types of persons with limited knowledge of fire use. Although they are also less likely to be frequent wildland users, over half of them make some use of wildland and a considerable proportion are frequent users. Average knowledge scores for this latter group, although higher than those of non-users or less frequent users, were significantly lower than those in other occupational status. Attitude scores did not differ greatly from one occupation status category to another.

Occupations of respondents–White collar workers rated higher than blue collar workers in terms of average knowledge scores. However, there was considerable variation among specific occupations. Persons in managerial, professional, and craftsmen positions had the highest average knowledge scores; laborers (farm and other) had the lowest.

Chief earner for family–Respondents who were the chief source of income for their families did not differ greatly from those respondents who were in a more dependent position in terms of the variable being considered.

Occupation of chief earner–The distribution by chief earner's occupation was quite different from that by respondent's occupation, but the relationships to knowledge, attitude, and wildland use were quite similar.

Length of residence, place of previous residence–These variables were only slightly, if at all, related to the knowledge, attitude, and wildland use levels of the respondents. People who had lived in the area less than one year, and those who had formerly lived in southern California, had slightly more favorable attitudes than did those in other categories.

Income–Income and knowledge level were closely correlated. Controlling for wildland use does reduce this relationship considerably, although wildland use, itself, is also related to income.

Sex–Males made much more use of the wildlands and, on the average, had a much higher knowledge score than did females. Among *frequent* wildland users, however, females were nearly as knowledgeable

Table 1–*Correlation*[1] *of knowledge score, attitude score, and wildland activity with selected socio-economic characteristics and fire-related activities of Butte County, California, residents, 1970*

Item	Correlation with . . .		
	Knowledge score[2]	Attitude score[3]	Wildland use[4]
Knowledge score	1.000***	−0.133***	0.118***
Attitude score	−.133***	1.000***	−.129***
Wildland activity	.118	−.129***	1.000***
Socio-economic characteristics:			
Age	−.138***	.007	−.219***
Marital status	−.108***	.025	−.169***
Education	.245***	−.102***	.145***
School status	−.086***	.075**	−.146***
Occupational status	−.154***	.152*	−.090***
Respondent's occupation	−.074***	.050*	−.135***
Chief earner	.045*	−.030	−.051*
Chief earner's occupation	.064**	.055*	−.045*
Length of residence	.059*	.024	−.002
Previous residence	.033	−.051*	−.038
Income	.171***	−.048*	.187***
Sex	−.180***	−.017	−.205***
Race	−.146***	−.046*	−.069**
Residence	−.030	−.047*	−.008
Risk rating of residence	.048*	−.048*	.190***
Familiarity with fire:			
Fire use	−.096***	.002	.374***
Possession of campfire permit	.046*	−.057*	−.222***
Possession of burning permit	−.020	−.040	−.090***
Observed forest fire	.300***	−.060*	−.159***
Helped fight forest fire	.196***	−.022	−.144***
Seasonal fire pattern	.211***	−.034	−.052*
Impression of activities and agencies:			
Fire control laws	−.047*	.173**	.036
Enforcement of fire control laws	−.026	.061**	.024
Fire prevention job done by schools	.072**	.037	.058*
Fire prevention job done by California Division of Forestry	−.039	.180**	−.095***

[1] Determined by Kendall's tau rank order.
Values without asterisks are not statistically significant.
* Significant at 5 percent level; ** Significant at 1 percent level; *** Significant at 0.1 percent level.
[2] Percentage of correct answers to a 20-item test of knowledge of fire behavior and fire prevention.
[3] Based on an 18-item test in which responses were on a five-place scale ranging from "strongly agree" to "strongly disagree." The most positive response received a weight of 1 and the most negative a weight of 5. The higher the score the more negative the attitude expressed.
[4] Based on response to a question on how often the respondent had visited wildland areas during the year before the interview. Responses varied from "none" to "11 or more times" (including "lives or works there").

as males. Attitudes regarding fire prevention were little influenced by sex.

Race–The few people of races other than white in the Butte County population makes it difficult to generalize about the effect of this variable on knowledge, attitudes, and wildland use levels. Respondents of Spanish, Mexican, or Latin-American origin (who were differentiated from other whites only in the 1970 survey) had a relatively high proportion of frequent users who scored low on the knowledge test. Language difficulties may have influenced these scores, although bilingual interviewers were provided where difficulty was anticipated.

Location of residence and residence risk rating–These variables were not significantly related to knowledge and attitude levels of Butte County respondents.

FAMILIARITY WITH FIRE

Several items in the 1970 questionnaire measured the extent of the use of fire by the Butte County residents and their familiarity with fire.

Respondents who reported that they had used fire during their excursions into the wildlands during the previous year tended to have a higher knowledge

score. However, frequent fire users were not more knowledgeable than were those people whose experience was limited to one or two occasions. Frequent wildland users continued to be more knowledgeable regardless of levels of fire use.

People who had obtained a campfire permit had higher knowledge scores than those who had not. This relationship held regardless of the level of wildland use. (Seven individuals reported having a campfire permit although they said they had not visited the wildlands.)

Possession of a burning permit was not related to knowledge scores.

Respondents who reported *ever* having seen a forest fire close at hand and those who reported *ever* having helped fight a forest fire had significantly higher knowledge scores than did those who had not had this experience.

Awareness that in California the fire danger gets progressively worse through the summer and fall was associated with higher scores on the general fire knowledge test. This difference in awareness of seasonal fire pattern by knowledge score did not prevail among infrequent wildland users.

Attitude scores were only slightly related to the variables measuring familiarity with fire in California. Generally, any differences observed were in the expected direction; that is, more favorable attitudes are associated with a person's familiarity with fire and with wildland use. The most negative attitudes observed were among people who said they did not know the seasonal pattern of fire danger in California and who reported no wildland activity. Relatively negative attitude scores were also found among those who reported actual fire use during frequent visits to wildlands.

ATTITUDES TOWARD FIRE PREVENTION

The 1970 questionnaire had also asked the respondents' impression of the existing fire control laws, their enforcement, and an assessment of the fire prevention job being done in the schools and by the California Division of Forestry.

The bulk of the responses concerning fire control laws and their enforcement were quite evenly divided between "about right" and "not strict enough." Regardless of the amount of wildland activity, respondents who felt the fire control laws and their enforcement were "not strict enough" tended to score highest on the knowledge test.

A sizable minority felt that schools were doing a poor job in teaching fire prevention to children. Nearly all respondents felt that the California Division of Forestry was doing a satisfactory, if not excellent, fire prevention job. Differences were not great, but those who selected an intermediate response (satisfactory) had somewhat lower knowledge scores than did those who revealed more positive or negative impressions. This was true regardless of the level of wildland activity experienced.

Respondents who felt that fire control laws and the enforcement of these laws was "not strict enough" had more favorable scores on the general attitude test than did those who gave other responses. Those who felt that the fire prevention job being done by the schools and by the California Division of Forestry was "excellent" also had more favorable general attitude scores. This relationship, likewise, remained true when activity in the wildlands was controlled.

CONCLUSIONS

Much of our fire prevention effort is directed at children. This emphasis is based on sound tactical and strategic reasons. Children are responsible for a significant proportion of wildland fires.[5] More importantly, the patterns of carelessness or cautiousness, indifference or concern people establish as children largely determine the way they relate to fire as adults. Some fire prevention efforts, of course, still must be directed at adults who are considered fire risks. Development of effective fire prevention programs for these individuals is dependent on a clear understanding of the type(s) of people in need of this influence—that is, those who are most likely to start forest fires through carelessness or ignorance. Few people are actually identified with the fires they have started, so that those who are apprehended may represent a rather distorted sample of the total responsible population.

One major focus of our research, therefore, is more definitive characterizations of high fire-risk types. In this study such a characterization was made on the basis of the respondents' knowledge about the proper use of fire, attitudes relating to such use, frequency of forest use, and various social and economic variables. People with little knowledge and unfavorable attitudes coupled with frequent wildland visits were presumed to represent greater risk than were those with opposite characteristics.

Age, sex, education, and income were the variables most closely related to variations in knowledge, attitude, and activity. People over 65 years of age with a grade school education and low income tended to be

those most representative of the high-risk population, although no type of person was unrepresented. Retired person or housewife was the occupational status of people disproportionately represented. As might be expected, people not currently in school were also heavily represented. Although in general, females tended to have lower knowledge scores and more unfavorable attitudes, those who were frequent visitors to wildland area did not differ significantly from their male counterparts in these measures.

Although younger persons, *on the average,* did not differ significantly from the total population in terms of their knowledge and attitude scores, their high activity level indicates that a large proportion of the high-risk population is included in their midst. This would suggest that in risk potential, the high-risk groups identified in the earlier study [2]—namely, young, limited education, lower income—also represent a target group for special fire prevention attention.

Familiarity with fire and its use in wildland areas, as demonstrated by such measures as possession of a campfire permit, personal experience with forest fire, and knowledge of the seasonal pattern of fire danger in California was associated with high scores on the general test of fire knowledge, but was only slightly associated with attitude scores.

Respondents with positive attitudes toward fire control laws and their enforcement tended to have higher scores on both of the general tests of fire knowledge and attitude. They generally had a favorable assessment of the job being done by the California Division of Forestry, but a negative appraisal of the fire prevention effort of the schools.

NOTES

[1] Christiansen, John R., and William S. Folkman. 1971. *Characteristics of people who start fires.* USDA Forest Serv. Res. Note PSW-251, 5 p. Pacific Southwest Forest and Range Exp. Stn., Berkeley, Calif.

[2] Folkman, William S. 1965. *Residents of Butte County, California: their knowledge and attitudes regarding forest fire prevention.* USDA Forest Serv. Res. Paper PSW-25, 32 p., illus. Pacific Southwest Forest and Range Exp. Stn., Berkeley, Calif.

[3] Folkman, William S. 1973. *Fire prevention in Butte County, California . . . evaluation of an experimental program.* USDA Forest Serv. Res. Paper PSW-98, 23 p., illus. Pacific Southwest Forest and Range Exp. Stn., Berkeley, Calif.

[4] Other tables detailing results of this study are available upon request to Director, Pacific Southwest Forest and Range Experiment Station, P.O. Box 245, Berkeley, California 94701.

[5] California Division of Forestry. 1973. *Wildfire activity statistics California Division of Forestry,* 164 p. Sacramento, Calif.

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